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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/083,647	02/27/2002	Jan Sunner	056622-5001	1807

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EXAMINER
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KALIVODA, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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2881

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/083,647

Applicant(s)

SUNNER ET AL.

Examiner

Christopher M. Kalivoda

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

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## **DETAILED ACTION**

### ***Specification***

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 8, 12, 14-15, 21-22, 24-32, 34, 38-44, 50-51 and 53-55 are rejected under 35 U.S.C. 102(b) as being taught by Benninghoven, et al. U.S. Patent 4,427,059. Regarding claims 1, 2, 25, 27, 28, 41 and 54, Benninghoven, et al. teaches producing an analyte ion, comprising:

a. providing a substrate having a non-porous rough surface (see column 2, line 39-45 and column 6, lines 56-57);

b. contacting an analyte with said non-porous rough surface whereby said analyte interacts with said non-porous rough surface (see column 5, lines 47-53); and

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c. exposing said non-porous rough surface to an energy source to produce an ionized gas phase analyte (see column 9, lines 10-12). The energy source is a laser.

Regarding claims 3, 4, 40 and 42, Benninghoven, et al. teaches that the analyte contacting the non-porous rough surface is a gaseous analyte and the contacting of the gaseous analyte occurs by means of either a gas injector or as a gas stream directed towards said non-porous rough surface (see column 5, 37-39 and column 7, lines 19-23). In this case, "exposing the solid with its test surface to the gas atmosphere" is interpreted to mean exposing the test surface to the gas in any manner.

Regarding claims 5 and 32, Benninghoven, et al. teaches said non-porous rough surface has sub-micrometer surface features (see column 6, lines 56-57). Micro-roughness can include 0.5um for example, which is sub-micrometer.

Regarding claims 8 and 34 Benninghoven, et al. teaches the substrate comprises at least one member of the group consisting of silicon, carbon, and polymers (see column 9, lines 22-24).

Regarding claim 12, Benninghoven, et al. teaches roughening the surface of the substrate using a surface roughening treatment (see column 6, lines 56-57).

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Regarding claims 14, 15, 38, 39, 43 and 44, Benninghoven, et al. teaches further analyzing a physical property of the ionized gas phase analyte. In addition, the analysis is performed by means of at least one member selected from the group consisting of mass spectrometry, ion mobility spectrometry, and a current measurement device (see column 7, lines 17-19).

Regarding claims 21 and 50, Benninghoven, et al. teaches the analyte is a gaseous eluate from a gas chromatograph (see column 8, lines 20-26).

Regarding claims 22, 24, 51 and 53, Benninghoven, et al. teaches the analyte is obtained from ambient air and at ambient pressure (see column 9, lines 36-39).

Regarding claims 29 and 30, Benninghoven, et al. teaches said non-porous rough surface is structured to promote the adsorption of the analyte on said surface (see column 8, lines 26-29).

Regarding claims 26 and 55, Benninghoven, et al. teaches repeatedly pulsing the substrate with laser light and contacting of the analyte to the substrate occurs during and between laser pulses (see column 9, lines 10-12).

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Regarding claim 31, Benninghoven, et al. teaches the non-porous rough surface is structured to promote desorption of ionized gas phase analyte from the surface (see column 9, lines 10-12).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 7 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059. Regarding claims 6, 7 and 33, Benninghoven teaches the roughening of surfaces to sub micron as described above. However, the reference is silent with respect to the specific sizes.

It is well known to optimize within the prior art conditions (see MPEP 2144.04 In re Aller, 220 F.2d. 454, 456, 105, USPQ 233, 235).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to use surface features smaller than about 0.1  $\mu\text{m}$  or between about 10 nm and about 1  $\mu\text{m}$ .

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The motivation for roughing the surface to these values would be to improve the contact between the surface and the analyte.

Claims 9, 10, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059. Benninghoven teaches the substrate comprising at least one member of the group consisting of silicon, carbon, and polymers as described above. However, the reference is silent with respect to the substrate being single crystal silicon or highly orientated pyrolytic graphite.

It is well known to select material based on suitability for its intended use (see MPEP 2144.04; Sinclair & Carrol Co. v. International Corp., 325 U.S. 327, 65 USPQ 297 (1945))

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to select a single crystal silicon substrate or highly oriented pyrolytic graphite.

The motivation for selecting these materials would be based on their common use and widespread availability and cost.

Claims 11 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059 in view of Zare, et al. U.S. Patent

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4,988,879. Regarding claims 11 and 37, Benninghoven, et al. describes the limitations of claim 1 as described above. However, the reference is silent with respect to the surface supported on a low heat conductivity material.

Zare, et al. teaches the use of low conductivity material supports (see column 8, lines 45-47).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to use low conductivity supports to support the non-porous rough surface.

The motivation for using low conductivity materials would be to withstand the heating rates due to the laser (see column 8, lines 30-35).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059 in view of Applicant's admission of prior art. Benninghoven, et al. teaches a surface roughening treatment as described above. However, the reference is silent with respect to the specific treatment method used.

Applicant states various methods of surface treatments on page 7, lines 14-18.



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Therefore, it would have been obvious to one skilled in the art at the time the invention was made to use one of the treatment methods selected from the group consisting of etching, bombardment with hyper thermal reactive atoms or high-energy particles, irradiation with lasers, exposure to plasma, vapor deposition, and mechanical means.

The motivation for using one of these means is that they are well known and can be used to achieve the desired surface roughness.

Claims 16 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059 in view of Clough, et al. U.S. Patent 5,326,633. Regarding claims 16 and 44, Benninghoven, et al. teaches the method according to claims 1 and 41 as described above. However the reference is silent with respect to cooling a substrate.

Clough, et al. teaches cooling a substrate to a temperature lower than a vaporous composition (see column 11, lines 49-52).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Benninghoven, et al. to include cooling the substrate prior to contacting the analyte with the non-porous rough surface.

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The motivation for this improvement would be to condense the gaseous analyte onto the substrate since it is at a cooler temperature. The amount of condensation can be controlled by the temperature differential (see column 11, lines 57-60).

Claims 17-20, 23, 46-49 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benninghoven, et al. U.S. Patent 4,427,059 in view of Hutchens, et al. U.S. Patent Application 2002/0155620. Regarding claims 17 and 46, Benninghoven, et al. teaches the method according to claims 1 and 41 as described above. However, the reference is silent with respect to adding a matrix to the non-porous rough surface.

Hutchens et al. describe the use of a matrix with a non-porous surface (see para 0027 and 0028).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Benninghoven, et al. to include a matrix material on the non-porous rough surface.

The motivation for this improvement would be to analyze different types of molecules associated with MALDI such as biomolecules and macromolecules (See para 0025).

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Regarding claims 18 and 47, Hutchens et al. teaches the matrix selected from the group consisting of water, glycerol, and acetic acid (see para 0089).

Regarding claims 19 and 48, Hutchens, et al. teach the addition of the matrix to the non-porous surface occurs by adsorption (see para 0028).

Regarding claim 20, 23, 49 and 52, Hutchens et al. teach exposing the non-porous surface to an energy source (see para 0052). The energy source is a laser and the matrix absorbs the laser energy.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Kalivoda whose telephone number is (703)-305-7443. The examiner can normally be reached on Monday - Friday (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (703)-308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9318 for regular communications and (703)-872-9319 for After Final communications.

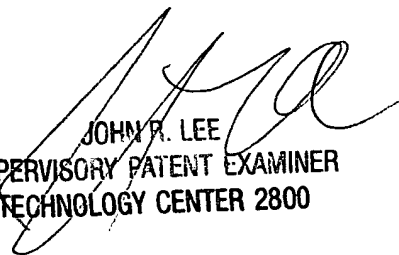
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0956.

cmk  
June 6, 2003

  
JOHN P. LEE  
SUPERVISORY PATENT EXAMINER  
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